Serial No. 09/965,558
Atty. Doc. No. 01P17802US

IN THE CLAIMS

1. (currently amended) A method of making ~~a~~ an insulating material used as a thermal insulating layer, comprising the steps:

providing a first permeable extracting membrane material structure that is permeable to a liquid portion of a slurry comprising a sinterable binder but that is not permeable to a solid portion of the slurry;

providing a second permeable structure at a distance away from the first structure thereby defining a first void between the first and second permeable structures;

placing geometric shapes in the first void between the first and second permeable structures;

providing ~~a~~ an impermeable restraining structure a distance away from the second permeable structure and opposite the first structure defining a second void between the second permeable structure and the impermeable structure;

introducing the slurry into the second void between the second permeable structure and the impermeable structure;

applying pressure in the second void between the second permeable structure and the impermeable structure forcing the slurry through the second permeable structure and around the geometric shapes thereby filling in any voids adjacent the geometric shapes and being forced against the first structure to form the insulating material;

removing the insulating material from between the first and second permeable structures;

~~drying the slurry around the geometric shapes to form a matrix material;~~ and

heating and drying the ~~matrix material to form the~~ insulating material.

2. (previously amended) The method according to claim 1 further comprising the step of, compacting the geometric shapes in the first void between the first and second permeable structures after placement of the geometric shapes in the first void.

3. (cancelled)

4. (cancelled)

5. (currently amended) The method according to claim ~~4~~ 1 wherein the step of applying pressure ~~and forcing the slurry against the extracting member thereby causing~~ causes capillary wicking of liquid from the slurry due to the extracting membrane member and further extracting any excess liquid from the slurry.

6. (currently amended) The method according to claim ~~4~~ 1, wherein the step of applying pressure causes capillary wicking of liquid from the slurry to form the ~~matrix~~ insulating material, and further comprising the step of drying the ~~matrix~~ insulating material at a drying temperature for an amount of time sufficient to dry the ~~matrix~~ insulating material to a green state.

7. (previously amended) The method according to claim 6 further comprising the step of firing the insulating material after the drying step at a temperature at least to 1200°C.

8. (cancelled)

9. (currently amended) The method according to claim 7, further comprising ~~wherein the heat~~ drying the insulating material and firing ~~steps occur~~ the insulating material at temperatures between 80-120°C and 1,000-1600°C degrees respectively.

10. (previously amended) The method according to claim 9 wherein the step of firing comprises ramping the temperature up at a rate between 3 degrees per minute and 10 degrees per minute from 120° C to 1600° C.

11. (previously amended) The method according to claim 1 wherein the first and second permeable structures are formed in respective geometric shapes dependant upon a planned use of the insulating material as a thermal insulating layer.

12. (currently amended) A method of making a ceramic material for use as a thermal barrier layer, comprising the steps:

providing a permeable structure having a first surface;

providing a fibrous material adjacent to the first surface of the permeable structure;

providing a porous membrane at a distance from the fibrous material, wherein the porous membrane and fibrous material define a sphere chamber;

placing hollow spheres into the sphere chamber;

providing an impermeable structure at a distance from the porous membrane, wherein the porous membrane and impermeable structure define a slurry chamber;

placing a flowable slurry comprising a sinterable binder into the slurry chamber;

applying pressure into the slurry chamber such that the slurry infiltrates through the porous membrane and around the hollow spheres and against the fibrous material;

removing liquid from the slurry in the slurry chamber to form a matrix material around the hollow spheres;

removing the matrix material and hollow spheres from the slurry chamber; and

heating the matrix material to form the ceramic material for use as a thermal barrier layer.

13. (previously amended) The method according to claim 12 wherein the permeable structure and the fibrous membrane provide a means for capillary wicking of liquid from the slurry through the permeable structure.

14. (original) The method according to claim 12 wherein the slurry comprises oxide filler and aluminum phosphate and a liquid.

15. (previously amended) The method according to claim 12 wherein the porous membrane is a perforated sheet of material defining plurality of holes therein having a diameter to allow an even flow of the slurry to pass therethrough and provides an even distribution of the slurry into the sphere chamber around the spheres.

16. (previously amended) The method according to claim 12 wherein the hollow spheres are selected from the group consisting of Mullite, Alumina, Zirconia and any combination thereof.

17. (previously amended) The method according to claim 12 wherein the fibrous material comprises aluminosilicate fibers.

18. (original) The method according to claim 12 wherein the step of applying pressure is achieved by applying 5 to 20 psi of pressure.

19. (previously amended) The method according to claim 12 further comprising the step of :

continuing the step of applying pressure to wick liquid out of the slurry through the fibrous material to dry the slurry to form the matrix material; and

removing the matrix material from the sphere chamber and drying the matrix material at a drying temperature for an amount of time to dry the matrix material to a green state.

20. (previously amended) The method according to claim 19 further comprising the step of firing the matrix material after the drying step at a temperature at least to 1200°C.

21. (previously amended) The method according to claim 20 wherein the step of drying the matrix material further comprises heating the matrix material.

22. (previously amended) The method according to claim 21 wherein the heat drying and firing steps occur at a temperature between 100° C and 1500° C degrees and for an amount of time up to 12 hours.

23. (previously amended) The method according to claim 20 wherein the step of drying and firing wherein the temperature is ramp up at a rate between 2° per minute and 15° per minute.

24. (previously amended) The method according to claim 12 wherein the permeable structure, the fibrous material, and the porous membrane have respective geometric shapes dependant upon the end use of the ceramic insulating material.